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Trent B. Thomas

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Curriculum Vitae

EDUCATION

Ph.D. in Earth and Space Sciences, Astrobiology .....2020-Present (Expected June 2026)
University of Washington, Seattle (UW) – *Dual-title Ph.D. & Data Science Certificate*

B.S. in Astrophysics 2016-2020
University of California, Los Angeles (UCLA) – *Phi Beta Kappa*

PROFESSIONAL EXPERIENCE

National Science Foundation Graduate Research Fellow 2020-Present
University of Washington, Seattle – *Advisors: David Catling, Victoria Meadows*

Visiting Researcher 2024
Massachusetts Institute of Technology (MIT) – *Advisors: Gaia Stucky de Quay, Hamish Mitchell*

Research Intern..... 2018-2023
NASA Jet Propulsion Laboratory (JPL) – *Advisor: Renyu Hu*

PEER-REVIEWED PUBLICATIONS

Summary: 6 publications, 5 as first/second author. 84 citations, h-index = 4 (Google Scholar).

FORTHCOMING

1. **Thomas, T. B.**, et al., (In prep.). Interior constraints from the volcanically-supported, SO_2-dominated atmosphere on the exoplanet L 98-59 b.
2. **Thomas, T. B.,** Stucky de Quay, G., & Mitchell, W.H. (In prep.). Automatic Image Segmentation of Alluvial Fans and Deltas on Mars with Deep Learning. [See the associated GitHub repository]

PUBLISHED/IN PRESS

3. **Thomas, T. B.,** Macdonald, F.A., & Catling, D.C., 2026, *Geology*. Seafloor Weathering Can Explain the Disparate Durations of Snowball Glaciations.
4. **Thomas, T. B.**, Meadows, V.S., Krissansen-Totton, J., Gialluca, M., Wogan, N., & Catling, D.C., 2025, *The Planetary Science Journal*. Statistical Geochemical Constraints on Present-Day Water Outgassing as a Source of Secondary Atmospheres on the TRAPPIST-1 Exoplanets.
5. Adams, D., Scheucher, M., Hu, R., Ehlmann, B., **Thomas, T. B.**, Wordsworth, R., Scheller, E., Lillis, R., Smith, K., Rauer, H. & Yung, Y., 2025, *Nature Geoscience*. Episodic Warm Climates on Mars Primed by Crustal Hydration.

6. **Thomas, T.B.**, & Catling, D.C., 2024, *Nature Communications*. Three-stage Formation of Cap Carbonates after Marinoan Snowball Glaciation Consistent with Depositional Timescales and Geochemistry.

7. **Thomas, T. B.**, Hu, R., & Lo, D.Y., 2023, *The Planetary Science Journal*. Constraints on the Size and Composition of the Ancient Martian Atmosphere from Coupled CO_2–N_2–Ar Isotopic Evolution Models.

8. Hu R., & **Thomas, T.B.**, 2022, *Nature Geoscience*. A Nitrogen-Rich Atmosphere on Ancient Mars Consistent with Isotopic Evolution Models.

INVITED LECTURES

Department Seminar – University of Victoria, Earth and Ocean Sciences 2025
Astrophysics Colloquium – LMU Munich, Center for Geoastronomy 2025
Department Seminar – University of Southampton, National Oceanography Center 2025
PaleoLunch Seminar – UW 2025
Department Seminar – Dartmouth College, Earth Sciences 2025
Astrobiology Department Seminar – UW 2024
Planetary Lunch Seminar – UW 2024
Planetary Climate and Habitability Research Group Meeting – Harvard University 2024
Gaia Lab Meeting – MIT 2024
Virtual Planetary Laboratory Seminar – NASA/UW 2023
High Performance Computing Seminar – NASA JPL 2022
ROCKE-3D Planetary Climate Group Meeting – NASA GISS 2022
Mars Atmosphere Group Meeting – Caltech 2020

SELECTED FELLOWSHIPS & AWARDS

David A. Johnston Award for Research Excellence – UW ESS 2025
Best Paleoclimate and Sedimentology Talk – UW ESS Research Gala 2025
Finalist, Student Poster Competition – Astrobiology Science Conference 2024
Winglee Endowed Graduate Support Fund and Space Physics Fellowship – UW ESS 2023
Best Astrobiology Talk – UW ESS Research Gala 2023
National Science Foundation Graduate Research Fellowship (NSF GRFP) 2020
Dean's Prize for Excellence in Undergraduate Research – UCLA 2020
Early Career Collaboration Award – NASA Astrobiology 2019
Rudnick-Abelmann Scholarship – UCLA Physics & Astronomy 2019
3 additional travel grants from NASA, AAS, & LPI

TEACHING & MENTORSHIP

CLASSES TAUGHT

Generative Design: Creating Art with Code (PI) – Coyote Central ..... Summer 2024, 2025
I created and instructed a 20-hour course for K-12 students with no prior coding experience. See their final projects here: 2024, 2025.
Introduction to Geology and Societal Impacts (TA) – UW ESS ..... Fall 2024
Earth's Origin and Transformation over 4.6 Billion Years (PI/TA) – UW ESS ..... Winter 2023
I developed ten 80-minute lectures, syllabus, and course material. I guest lectured "The history of life on Earth" and performed TA duties.

MENTORSHIP

Undergraduates: Veronica Fula (UW), Jasmine Singh (Purdue)

ADDITIONAL TRAINING

Mars Analog Workshop – UW Astrobiology 2023
Sagan Summer Workshop – NASA Exoplanet Science Institute 2023
Origin of Life Workshop – UW Astrobiology 2022
Storytelling Fellows Podcasting Workshop – UW Libraries 2022
Planetary Exploration Mission Design Workshop – UW Astrobiology 2022
VPLanet Developers Workshop – Virtual Planetary Laboratory 2021
ROCKE-3D GCM Tutorial – NASA GISS 2021
Quantitative Habitability Workshop – NASA NExSS 2020
Exoclimes Simulation Platform Summer School – University of Bern 2019

SERVICE

Peer review: *Nature Communications*, *Icarus, The Open Journal of Astrophysics*
Early Career Committee – NASA LIFE Research Coordination Network 2025-Present
Responsibilities include organizing the virtual seminar series, workshops, and conference events.
Expert Screener – CDRXIV, Preprints and Data for Carbon Dioxide Removal 2025-Present
Department Representative – UW CoEnv Student Advisory Council 2024-2025
Committee Member – UW ESS 2020-Present
Awards, computing, graduate-nominated speaker (x2), retreat, peer mentor, planetary science faculty hiring.

PUBLIC ENGAGEMENT

COMMUNITY OUTREACH

Guest Speaker – Everett Rock and Gem Club 2025
Science Guest – Bandit Theater, Mad Science Improv 2025
Classroom Mentor (20 hours, 8 students) – Coyote Central Youth Arts Organization 2024
Contributor – NASA NExSS & NASA NFoLD Science Communication ..... 2022 – 2023
Speaker (Mars: Why the Hype?) – Astronomy on Tap, Seattle 2022
Volunteer Teacher (8 hours, 120 students) – Nelson Middle School, Seattle 2022
Page Creator (Prebiotic atmosphere) – Wikipedia 2022
Invited Speaker – Delran School System Family STEM Night 2022

Social Media Manager – UW Astrobiology 2021-2022
Creator & Moderator – UW Astrobiology Public Science Panel Series 2021
Volunteer Guide – UCLA Planetarium 2019-2020
Volunteer Scientist – UCLA Exploring Your Universe 2019

MEDIA COVERAGE

GSA – Rudy Molinek: Understanding "Snowball Earth" Extreme Climates — When the World Is Covered in Ice 2026
UW News – Hannah Hickey: Explaining dramatic planetwide changes after world's last 'Snowball Earth' event 2024
NASA Astrobiology – Aaron Gronstal: The Size and Shape of Mars' Ancient Atmosphere 2023
LPI Planetary News – Isotopic Evidence that Ancient Mars' Atmosphere was More Earth-Like 2022

CONFERENCE ACTIVITY

[O] = oral (12), [P] = poster (5), * = presentation award (3)

1. **Thomas, T.B.,** Macdonald, F.A., and Catling, D.C. (2025) "Seafloor weathering controls the duration of Neoproterozoic Snowball Earth glaciations". American Geophysical Union Fall Meeting. New Orleans, Louisiana. [P]
2. **Thomas, T.B.,** Meadows, V.S., Krissansen-Totton, J., Gialluca, M., Wogan, N., and Catling, D.C. (2025) "Water outgassing as a source of secondary atmospheres on the TRAPPIST-1 exoplanets." STScI Atmospheric Escape and Replenishment Workshop. Baltimore, Maryland. [O]
3. **Thomas, T.B.,** Macdonald, F.A., and Catling, D.C. (2025) "Seafloor weathering controls the duration of Neoproterozoic Snowball Earth glaciations". Life and Planet Conference. London, England. [P]
4. **Thomas, T.B.,** Macdonald, F.A., and Catling, D.C. (2025) "Long duration of the ~56 Myr Sturtian Snowball Earth event suggests missing link in the geologic carbon cycle". European Geoscience Union General Assembly. Vienna, Austria. [O]
5. ***Thomas, T. B.,** (2025) "Fundamental aspects of Snowball Earth revealed by a global carbon cycle model". UW Earth and Space Science Research Gala. Seattle, Washington. [O]
6. ***Thomas, T. B.**, and Catling, D. C., (2024) "A New Model for the Formation of Cap Carbonates after Neoproterozoic Glaciations". Astrobiology Science Conference. Providence, Rhode Island. [P]
7. **Thomas, T. B.,** et al., (2024) "Constraints on water outgassing rates on the TRAPPIST-1 planets from interior modeling". Extreme Solar Systems V. Christchurch, New Zealand. [P]
8. **Thomas, T. B.**, and Catling, D. C., (2023) "Untangling Planetary Processes in the Neoproterozoic with Cap Carbonates and a Geologic Carbon Cycle Model". Goldschmidt Conference. Lyon, France. [O]
9. ***Thomas, T. B.**, (2023) "The 4 Billion Year History of Mars's Atmospheric Evolution Revealed by Isotopic Evolution Models". UW Earth and Space Science Research Gala. Seattle, Washington. [O]
10. **Thomas, T. B.**, Hu, R., and Lo, D. Y., (2022) "Constraints on the Evolution and Ancient Composition of the Martian Atmosphere from Coupled CO2-N2-Ar Isotopic Evolution Models". 54th Division for Planetary Science Conference. London, Ontario, Canada. [O]

11. **Thomas, T. B.**, and Catling, D. C., (2022) “A Self-Consistent Model for Generating Marinoan Cap Carbonates and Constraining Neoproterozoic Climate”. Astrobiology Science Conference. Atlanta, Georgia. [O]
12. **Thomas, T. B.,** (2022) “A Self-Consistent Model for Generating Marinoan Cap Carbonates and Constraining Neoproterozoic Climate”. UW Earth and Space Science Research Gala. Seattle, Washington. [O]
13. **Thomas, T. B.**, Hu, R., and Lo, D. Y., (2022) “Joint Models for the Evolutionary History of Carbon, Nitrogen, and Argon in the Martian Atmosphere”. 53rd Lunar and Planetary and Science Conference. The Woodlands, Texas. [O]
14. **Thomas, T. B.**, and Hu, R., (2020) “A Nitrogen-Rich Atmosphere on Ancient Mars Indicated by Isotopic Evolution”. American Geophysical Union Fall Meeting. Virtual. [O]
15. **Thomas, T. B.**, and Hu, R., (2020) “A Nitrogen-Rich Atmosphere on Ancient Mars Indicated by Isotopic Evolution. 52nd Division for Planetary Science Conference. Virtual. [O]
16. **Thomas, T. B.**, and Hu, R., (2020) “A Nitrogen-Rich Atmosphere on Ancient Mars Indicated by Isotopic Evolution”. UCLA Undergraduate Research Week. Virtual. [O]
17. **Thomas, T. B.**, and Hu, R., (2019) “Evolutionary History of the Isotopic Composition of Nitrogen in the Martian Atmosphere”. 9th International Conference on Mars. Pasadena, California. [P]

Session Organization

1. Primary Convener. “Global Environmental Changes and Increased Biological Complexity in the Neoproterozoic and Paleozoic”. American Geophysical Union Fall Meeting, New Orleans, Louisiana (2025)
2. Primary Convener. “Global Environmental Changes and Increased Biological Complexity in the Neoproterozoic and Paleozoic”. Astrobiology Science Conference, Providence, RI (2024)